Abstract Submitted
for the DPP08 Meeting of
The American Physical Society

Formation of high energy particles through collisionless driven reconnection RITOKU HORIUCHI, National Institute for Fusion Science — The energy conversion process in collisionless driven reconnection is studied by using an electromagnetic particle simulation code in a microscopic open system (PASMO). Kinetic regime appears in the central current layer, in which frozen-in condition is broken due to various kinetic effects, e.g., the inertia effect and the effect of nongyrotopic thermal motion. The kinetic regime consists of two dissipation regions with different spatial scales, i.e., ion dissipation region (IDR) and electron dissipation region (EDR). The out-of-plane component of electron average velocity at the center of EDR is found to reach the electron Alfven velocity evaluated at the edge of EDR, suggesting that most of magnetic energy carried into EDR is effectively converted into the electron kinetic energy. On the other hand, the energy conversion to ions takes place strongly inside the slow shock region in the downstream. Futhermore, strong in-plane electrostatic field accelerates unmagnetized meandering ions inside IDR and creates non-Maxwellian distribution with a hole structure in which distribution becomes two-peaked and only a few ions exist in the low energy region. Thus, the particle energy spectrum changes from initial thermal profile to non-thermal one with a high energy tail. Especially, this change happens strikingly in the ion energy spectrum.

Ritoku Horiuchi
National Institute for Fusion Science

Date submitted: 10 Jul 2008 Electronic form version 1.4